OPERATING INSTRUC[illegible]

FOR

MODEL 539A

TRANSCONDUCTANCE TUBE TESTER

THE HICKOK ELECTRICAL INSTRUMENT COMPANY
10514 DUPONT AVENUE
CLEVELAND 8, OHIO

539A-1052

THE INSTRUMENT PACKED HEREWITH IS:

	PACKER'S CHECK
1 MODEL 539A TRANSCONDUCTANCE TUBE TESTER	
ACCESSORIES INCLUDED WITH THE TESTER ARE:	
1 - BOOKLET INSTRUCTIONS	
2 - GRID LEADS	

SERIAL NO. _____

SIGNED: _____

FOREWORD

The Model 539A Mutual Conductance (Transconductance) Tube Tester is designed for use by technicians, engineers and others who demand an instrument of the very highest quality for rapid and accurate testing of vacuum tubes. Like all Hickok Tube Testers, it is based upon the well known formula for mutual conductance, $\frac{ip}{eg} = Gm$, where ip is the plate current change, eg is the grid voltage change, and Gm is the Mutual Conductance (Transconductance). Mutual Conductance and Transconductance are used interchangeably.

This instrument is equipped with three meters, all made in our own plant, and calibrated with great accuracy.

(a) A sensitive Transconductance meter measuring micromhos in five ranges up to 30,000 micromhos,

(b) an A.C. voltmeter which insures standardized voltages to the tube's base, and

(c) a two range (0-10, 0-50) D.C. voltmeter to accurately adjust the negative bias on the tube's control grid.

Voltage adjustments are made while the tube being tested is delivering its rated load.

NOTE: Always check a tube for shorts before proceeding with Mutual Conductance test.

INSTRUCTIONS FOR THE OPERATION OF MODEL 539A

Read these instructions through before attempting to operate the tester.

1. There are two rectifier tubes, an 83 and a 5Y3GT necessary to operate this tester. They are included.

The Short Lamp is a 1/4 watt, 110 volt, candelabra base neon signal lamp made by The General Electric Company. This lamp will last indefinitely unless broken.

The Fuse Lamp is a standard No. 81, single contact auto bulb. This can be procured from any auto dealer or gasoline station attendant. This fuse lamp is in the primary circuit of the transformer.

2. Use on 60 cycles 110-125 volt circuit.

FUNCTIONS OF THE VARIOUS CONTROLS:

3. The line adjustment control rheostat in the 539A tester is connected with a

small A.C. voltmeter as a constant calibration indicator which is normally always in circuit. The small A.C. voltmeter may also be used to register 60 cycles A.C. line voltage fed to the set by operating the test button P7 designated "LINE TEST" in the lower right part of the control panel. Readjust after pressing the P4 Test Button.

4. SELECTORS - The row of selector dials across the center of the control panel is for the purpose of conducting proper voltages to the tube's base pins. The operation of setting these dials is similar to DIALING A TELEPHONE NUMBER. On the roll data chart, below the word SELECTORS, appear the dialing numbers. These dialing numbers consist of two letters and five figures. Example: JR-6237-5. Starting at the left, the first dial is turned until the letter "J" appears through the window. The second dial is turned until "R" appears. The third dial indicates 6; the fourth, 2; the fifth, 3; the sixth, 7 and the seventh, 5.

The lettered dials control the filament or heater connections. The numbered dials control the GRID, PLATE, SCREEN, CATHODE AND SUPPRESSOR in that order. In the example given above the heater terminals are connected to pins 8 and 1. The GRID is connected to pin 6; PLATE, to pin 2; SCREEN, to pin 3; CATHODE, to pin 7 and SUPPRESSOR, to pin 5.

These dial switches are electrically interlocked in such a way that it is impossible to connect two different voltage elements to the same pin. Thus accidental shorts are avoided.

The dialing system is designed so that a minimum of dial setting is required. For example, the heater setting is practically always JR so that these two dials seldom need resetting. It will also be noticed that when testing duo-diode triode tubes the amount of dialing has been reduced to a minimum.

5. SHORT TEST - Turning the SHORTS switch successively through the positions 1-2-3-4-5 connects the various pairs of elements in turn across the test voltage. Tubes having shorted elements will complete the circuit and cause the neon SHORT lamp to glow. Tubes may be tested for shorts, either hot or cold.

A short is indicated by a steady glow of the neon lamp in certain positions of the SHORTS switch. A momentary flash of the lamp as the switch is turned from one position to another should be disregarded. This flashing is caused by the charging of a capacitor in the test circuit. A shorted tube should be discarded without further test.

6. LOCATING SHORTED ELEMENTS - In the following table (X) under any SHORT switch position indicates that the neon lamp glows in that position.

KIND OF SHORT	1	2	3	4	5
FIL -- CATHODE			X		
FIL -- GRID	X	X			X
FIL -- PLATE	X	X		X	X
FIL -- SCREEN	X		X	X	X
FIL -- SUP		X			
GRID -- CATHODE	X	X	X		X
GRID -- PLATE				X	
GRID -- SCREEN		X	X	X	
GRID -- SUP	X				X
PLATE -- SCREEN		X	X		
PLATE -- SUP	X			X	X
SCREEN -- SUP	X	X	X	X	X

7. NOISE TEST - The short test circuit is also used in making noise tests on vacuum tubes. Connections are made from the noise test jacks to the antenna and ground posts of any radio receiver. The tube under test is tapped with the finger as the SHORTS switch is turned through positions 1-2-3-4-5.

Intermittent disturbances which are too brief to register on the neon lamp will be reproduced by the loud speaker as static.

8. GAS TEST - The push switches P5 (Gas 1) and P6 (Gas 2) are used to test amplifier tubes for gas content.

a. Make Micromho test in the ordinary way.

b. Set the Bias Voltmeter switch to the 50 volt range. Hold down P5 and adjust the Bias knob to bring the meter reading down to a point about 1/5th or 1/4th of full scale, say near the mark DIODES O.K. This is not critical.

c. Hold down P5 and press P6. A gassy tube will cause the pointer to move UP the scale. If the upward movement is not more than one large division (two small divisions), the gas content is satisfactory.

Some tubes develop gas after being heated for a period of time. If a tube is suspected, allow it to heat for a few minutes. This constitutes a very sensitive gas test. Gas content on the order of 0.1 microampere can be detected.

Gas content is a very important factor in modern receivers of all types, containing AVC and AFC circuits as the presence of gas causes the grid to become conductive and as changes in grid bias operate through resistors of comparatively high value, correct functioning cannot be obtained with a gassy tube. The presence of gas results in actually changing the grid bias. Gas is especially harmful in television tubes.

9. DYNAMIC TRANSCONDUCTANCE - The Push Switch P4 is mechanically divided into two sections, non-locking and locking. Both sections perform identical electrical functions. If momentary contact is needed press the non-locking button. If extensive tests are to be made use the locking button. The locking button is released by pressing the non-locking button.

The indicating meter will register the tube's value in six ranges:

A. 30,000 µmho. at .25 volt signal
B. 15,000 µmho. at .25 volt signal
C. 6,000 µmho. at .5 volt signal
D. 6,000 µmho. at 2.5 volt signal
E. 3,000 µmho. at 2.5 volt signal
F. Rectifiers and diodes, signal removed.

The Micromho switch automatically changes the signal volts when the appropriate setting is made.

The chart setting for the tube to be tested will indicate where the Micromho switch should be set, such as A, B, C, D, E or F, in the column preceding Micromhos.

The Micromho values printed on the data roll are minimum values. Good tubes will read above these values.

In the column headed BIAS VOLTS is listed the exact voltage to which the BIAS VOLTS meter is to be set when testing a tube. Make final bias adjustment after the P4 button is pressed.

Certain pentode tubes, such as the 6AJ5, are tested with reduced screen voltage. This is accomplished by holding down P1 and pressing P4. Specific instructions are printed in the NOTATIONS column for each tube requiring reduced screen voltage.

10. RECTIFIER TEST - The push switches P1, P2 and P3 are used to test various types of rectifier elements.

a. The push switch P1 is used when testing detector diodes. It applies a low voltage which will not injure the delicate cathode. Good diodes will cause the meter pointer to read above mark, RECTIFIERS and DIODES O.K.

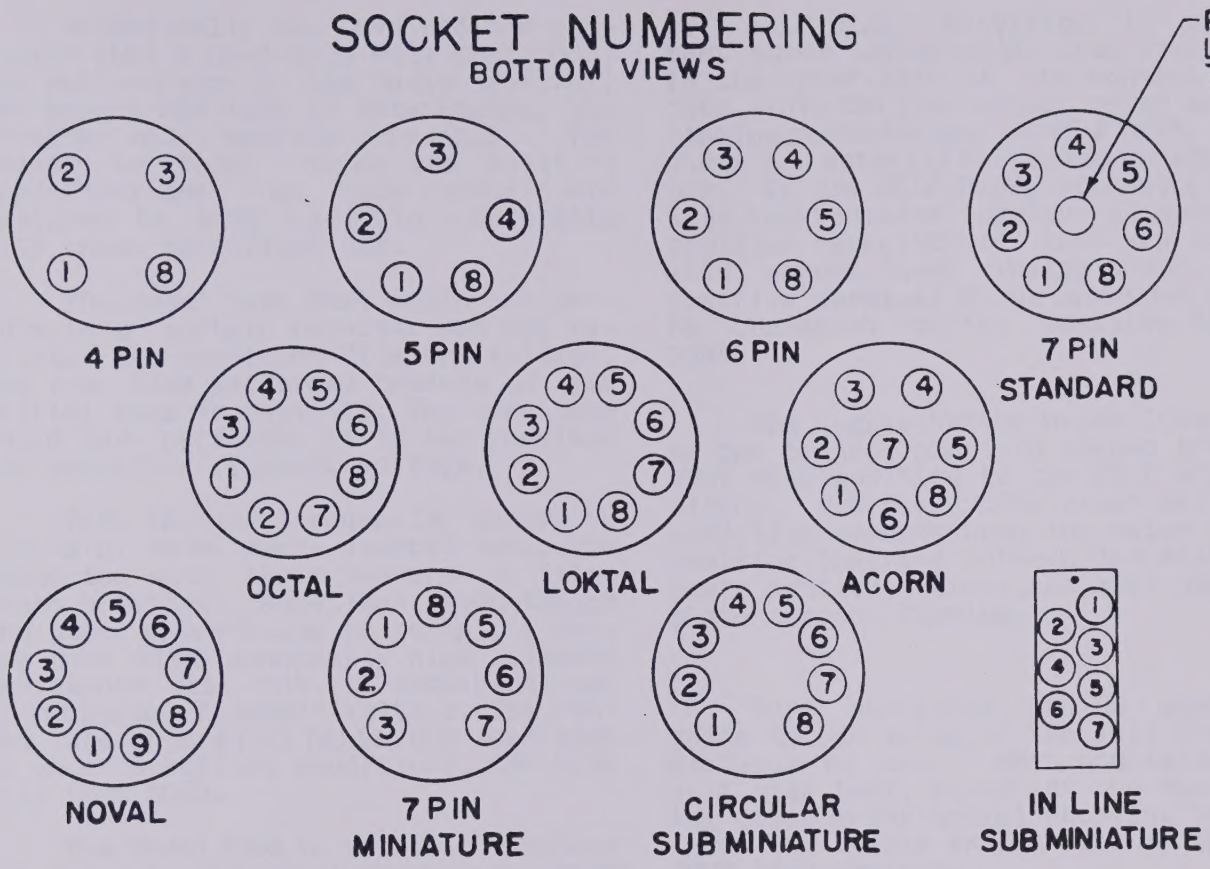
b. Push switch P2 is used when testing cold cathode rectifiers such as the 0Z4. This applies a voltage sufficiently high to ionize the tube and start conduction. Good tubes will read above the mark, RECTIFIERS and DIODES O.K.

c. Push switch P3 is used when testing ordinary rectifier tubes such as the 5Y3. This switch applies a medium voltage which is best adapted to reveal defects in this type of tube. Good tubes will read above the mark, RECTIFIERS and DIODES O.K.

In the chart column headed SHUNT are listed the numbers to which the SHUNT dial is to be set when testing Rectifiers and Diodes.

11. SOCKET NUMBERING - In order to reduce dialing to a minimum, the sockets in the Model 539A Tube Tester are numbered as shown. The numerical values of the lettered dials are as follows:

SOCKET NUMBERING
BOTTOM VIEWS



0 ---- A ---- P
1 ---- B ---- R
2 ---- C ---- S
3 ---- D ---- T
4 ---- E ---- U
5 ---- F ---- V
6 ---- G ---- W
7 ---- H ---- X
8 ---- J ---- Y
9 ---- K ---- Z

The letter "I" was omitted because of its resemblance to the figure "1". The letter "Q" was omitted because of its resemblance to the figure "O".

12. METER REVERSE - Directly below the indicating meter is a switch marked REVERSE-NORMAL. With certain tubes such as the 117N7, the meter, when set on NORMAL, will deflect backwards (to the left) when push switch P3 is pressed for rectifier test. In such case turn the meter switch to REVERSE which will cause the pointer to move up the scale. After this test has been made, return the switch to NORMAL.

13. TOP CAPS - There are two jacks in the upper center of the control panel marked GRID and PLATE. These are used when making connection to the top cap of the tube being tested. On the data chart in the NOTATIONS column opposite tube types having top caps, is the notation CAP=G or CAP=P. G means that the top cap is connected to the GRID and P, to the PLATE jack.

NOTE

The center of the large 7-pin socket is used to check pilot lamps. Set the filament selector switches on JR. Set the filament voltage switch to the proper voltage for the lamp being tested.

14. SPECIAL NOTES - Power line voltage varies with different localities. It may also vary with the different hours of the day.

While a national survey indicates that the average voltage for the USA is about 117 volts, it does not mean that every locality maintains a constant voltage at that level.

Occasionally we have had the complaint that a used tube will test GOOD, but will not work in the radio receiver; but when a NEW tube is substituted, the receiver will operate correctly. The answer is this: Tubes are built to specifications. Our tube testers are designed to test tubes in conformity with these specifications.

The used tube that would not perform in a certain receiver was not receiving its specified filament voltage. The new tube performed because of its initial reserve capacity. The used tube would have performed if it had received its specified filament voltage.

Tube failure frequently occurs in A.C.-D.C. sets where several tubes are connected with their heaters or filaments in series. Sometimes, even though the power line voltage is normal, a series tube with abnormally high filament resistance will rob its companion tube of its normal filament voltage. The robbed tube apparently fails; but when tested under specified conditions, the tube will test GOOD.

The Model 539A is valuable in matching tubes for push-pull stages and other applications where matched tubes are essential.

15. LIFE TEST - The Model 539A DYNAMIC MUTUAL CONDUCTANCE TUBE TESTER is equipped with a special feature to enable Life Test to be made on the tube. In the Lower Right of the control panel is a switch designated CATH. ACT., NORM. and TEST. While holding everything else at normal this switch reduces the filament voltage by 10%.

a. Measure the mutual conductance in the ordinary way with switch set on NORMAL.

b. Throw the CATH. ACT. switch to TEST position. The mutual conductance should not drop more than 20%.

c. After making life test return the switch to NORMAL for all other tests.

In testing the 35Z5 and 45Z5 rectifier tubes it is advisable to turn the power off for about 15 seconds after throwing the CATH. ACT. switch to TEST to allow the cathode to cool. Then turn the power on and note new reading of the meter.

16. SELF BIAS - Provision is made to test tubes under self bias condition. In the upper left of the control panel just above the line adjust meter are two binding posts designated SELF BIAS. These posts are normally shorted by an attached bar. To use SELF BIAS, connect a suitable bias resistor together with an electrolytic capacitor of 1000 μfd in parallel across these binding posts. The positive terminal of the capacitor should be connected to the positive binding post.

The toggle switch in the lower left of the control panel is thrown from ADJUST BIAS position to the SELF BIAS position. The bias volts under self bias condition depends upon the value of the resistor inserted between the self bias posts mentioned above, and also upon the plate current flowing.

Tube handbooks can be used as a guide to the value of the self bias resistance to use. When completing the self bias test, reconnect the two binding posts by the normal shorting bar and throw the toggle switch back to the ADJUST BIAS position.

17. PLATE CURRENT - In the upper left of the control panel just to the left of the SELF BIAS posts are two posts designated PLATE CURRENT. These posts are normally shorted by an attached bar. A suitable low resistance D.C. milliammeter connected across these posts will measure the plate current flowing through the tube being tested. Connect the positive terminal of the meter to the positive binding post.

NOTE: A D.C. milliammeter connected into the SELF BIAS circuit will measure the total cathode current. In measuring rectifier tube current the meter reading must be multiplied by two, because rectifier tubes conduct only during a positive half-cycle, whereas the meter integrates over a complete cycle.

In checking thyratrons such as the 884 and 885, the bias voltmeter should be set initially at its highest negative value (about 40 volts). The designated button is held down while the bias voltage is gradually reduced until the tube "strikes", that is, begins to conduct which is indicated by a sudden deflection of the meter. The chart indicates

the approximate voltage at which the tube strikes. There may be a small variation above or below the given striking voltage. The meter indication for a good tube is above the point designated "RECTIFIERS OK".

18. FILAMENT AND HEATER CONTINUITY

1. Turn the Tester on.

2. Set the selectors as per chart for the tube to be tested.

3. Set the FILAMENT switch on BLST instead of voltage indicated on the chart.

4. Set the SHORT TEST switch on position 1.

5. Place the tube in the proper socket.

If the neon lamp glows, the filament is good and a complete test should then be made on the tube, by setting FILAMENT switch on the proper tap, and while the tube heats, rotate the SHORT TEST SWITCH several times thru all positions. If no shorts are indicated, set the switch in TUBE TEST position and proceed to test the tube as per chart.

If the neon lamp does not glow, the filament is open and further test is unnecessary. Certain tubes such as the 35Z5-50Z7, etc., with tapped filaments have special continuity test settings; see roll chart.

NOTE

It sometimes happens that a filament will show continuity when cold, but will open when it warms up.

TO TEST BALLAST TUBES

1. Turn the Tester on.
2. Set the filament switch to BLST.
3. Set the SHORT TEST switch on 1.
4. Set the first selector switch (lettered A to K) to the letter shown in the column marked (first selector) -- Set all numbered selectors on zero --
5. Rotate the second selector switch (lettered P to Z) from P to Z. THE NEON LAMP SHOULD LIGHT IN POSITIONS NOTED.

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
1A1-1B1-1C1-1E1-1F1-1G1-1J1-1K1-1L1-1N1-1P1-1Q1-1R1G-1S1G-1T1G-1U1G-1V1-1Y1-1Z1-2	J	R						
2UR224	J			T				X
2LR212	H	R	S		U			
3	J	R						
03G	J			T				
4-5	J	R						
6-133	J			T				
6-6AA	J	R						
7-8-9	J	R						
10A-10AG	J			T				
10AB	J			T				X
K17B-M17C-BM17C	J			T				X
M17HG-M17H	J		S					X
	D	R						
K23B-K23C-KX23B-KX30C	J			T				X
M30H	J		S					X
	D	R						
30A-K30A	J			T				
K30D	J	R		T				X
33A-33AG	J			T				
K34B	J			T				X

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
36A	J			T				
K36B-BK36B-L36B-BM-L36C-KX36C	J			T				X
KX36A	J	R						
36D-L36D	J	R		T				X
L36DJ	J	R		T	U			X
K36H-M36H-M36HG	J		S					X
	D	R						
L40S1-L40S2	J	R		T		V		
42A	J			T				
42A1	H				U			
42A2-42B2	H		S		U			
K42B-L42B-M42B-KX42B-LX42B-L42BX-K42C-L42C-M42C	J			T				X
KB42D-K42D-L42D	J	R		T				X
LX42D-L42DX	J	R	S	T				
K42E-L42E	J			T				X
L42F	J							X
	D	R						
42HA-K42HJ-M42H-M42HG	J		S					X
	E	R		T				
KX42C	J			T				X
L42S1	J	R		T		V		
49A-49AJ-K49AJ	J			T				
KX49A	J			T				X
49A1	H				U			
49A2-49B2	H		S		U			
K49B-L49B-M49B-BM49B-K49C-M49C-BM49C-BK49C-K49E-L49E	J			T				X
K49D-BK49D-L49D	J			T				X
L49F	J							X
	D	R						
M49H-M49HG	J		S					
	D	R						
KZ49B-KZ49C	J	R				V		
K49BJ-L49BJ	J			T	U			X
L49S2	J	R		T		V		
49AJ-K49AJ	J			T				
KX49B-LX49B-LX49C	J			T				X
L49DJ	J	R		T	U			X
L49S3	J	R		T		V		
50A2	J	R		T				
50A2MG-50B2	J	R				V		
50X3	J	R						
K52H-M52H	J		S					X
	D	R						

TUBE TYPE	First Selector	Neon lamp should light in these positions.						
K54B	J			T				X
55A-K55A	J			T				
55A1	H				U			
KX55A	J	R						
55B-K55B-M55B-BM55B-L55BG-LX55B	J			T				X
55A2-55B2	H		S		U			
K55C-L55C-KX55C	J			T				X
K55CP	J			T		V		X
K55D-L55D	J	R		T				X
L55E-M55E	J			T				X
L55F-M55F-BL55F	J							X
	D	R						
K55H-M55H-M55HG	J		S					X
	D	R						
L55S1-L55S2	J	R		T		V		X
60R30G	J	R		T				
64.23	J			T				
67A	J			T				
K67B-L67B	J			T				X
L73B-K74B-L74B-CX74C	J			T				X
80A	J			T				
K79B-K80B-M80B-K80C-KX80B-L80B	J			T				X
K80F	J							X
	D	R						
KX87B-LX87B-L90B	J			T				X
K90F-M90F-K92F-M92F	J							X
	D	R						
92A	J			T				
L92B-95K2	J			T				X
L99D	J	R		T				X
100R8	J			T				X
120R	J	R						
120RS-135K1	J			T				X
135K1A	J			T	U			X
140L4-140L8-140R4-140R8	J	R		T				
140R	J	R						
140L44-140R44	J	R	S	T				
165L4-165R4-165R8	J	R		T				
165R	J	R						
165L44-165R44	J	R	S	T				
185L4-185L8-185R4-185R8	J	R		T				
185R	J	R						
185L44-185R44	J	R	S	T				
200R-250R	J	R						
250R8-290L4	J			T				X
300R4-320R4	J			T				X
340	J	R						
808-1	J			T	U			X
E14980-W43357-W4588-3613	J			T				X
3334-3334A	J	R		T				X
8593-8598-8601-8664	J			T				X
3ER248	J	R		T	U			X
3CR241	J	R		T				X

TUBE TYPE	First Selector	Neon Lamp Should Light in These Positions							
B9M15822	B			T					
	E					V			
	G							X	Y
B9M16067	J	R		T		V	W	X	
B9M16275	B			T	U	V	W	X	Y
B9M16534	J	R		T		V	W	X	
B9M17571	H	R		T					
	J				U	V		X	
B9M18941	B		S	T					
	E					V			
	G							X	Y
17A470303	J	R	S			V			
	D				U				
	G							X	
17A485459	J	R	S				W		
	D				U				
TBR102D	B		S	T	U	V			
	G							X	Y
TBR103D	B		S		U	V			
	G							X	Y
TBR104D	B		S	T	U	V			
	G							X	Y
397021	B		S	T					
397022	E					V	W		
397023	J							X	
397036	C					V			
407100	J	R	S			V			
408100	J	R	S			V			
	D				U				
SW507300	J	R		T		V	W	X	
571606	B		S	T					
	E					V	W		
	J							X	

PARTS LIST FOR MODEL 539A TUBE TESTER

TE: There is a minimum billing charge of $1.50 for any one parts order.

HICKOK CODE NO.	NAME AND DESCRIPTION	REF. SYMBOL OR FUNCTION
2490-161	BOOKLET: Instructions	
2920-7	BUTTON-Push: molded, black	
2920-8	BUTTON-Push: molded, red	
3085-40	CAPACITOR: 100 mfd, 6 V, electrolytic Cornell-Dubilier BRH-601	C6
3085-50	CAPACITOR: 8 mfd, 150 V, electrolytic	C4
3095-8	CAPACITOR: 470 mmf, 500 V, 10%	C5
3095-41	CAPACITOR: .0027 mfd, 500 V, 10%	C3
3105-24	CAPACITOR: .1 mfd, 400 V, paper	C7
3200-42	CHART: Data Roll	
1160-66	DIAL, Ass'y: with knob, beveled	ENGLISH
0300-1	JACK, Pin: red, Eby #52	
10300-2	JACK, Pin: black, Eby #52	
11500-11	KNOB, Ass'y: with pointer, Hickok bar	
2270-1	LAMP: neon glow, 1/4 watt, 115 volt	
2270-2	LAMP: #81 auto, Tung-Sol, bayonet type	
12270-12	LAMP: G.E. #47, 6-8 volts, .15 amp	PILOT
2450-145	LEAD, Ass'y: Plate	
2450-180	LEAD, Ass'y: Grid, Amphenol #63-1W	
6925-88	POTENTIOMETER: 1000 ohms, Mallory #M1MPX	R28
16925-63	POTENTIOMETER: 3000 ohms, linear, wire wound Mallory M3MPX	R16
250-44	CHOKE ASS'Y: retarding	R30(L1), R31(L2), R32(L3
8414-182	RESISTOR: 180,000 ohms, ½ W, 10%, fixed, comp.	R2
18415-102	RESISTOR: 1 meg, ½ W, 10%, fixed, composition	R27
3422-122	RESISTOR: 1200 ohms, 1 W, 10%, fixed, comp.	R6
3423-151	RESISTOR: 15,000 ohms, 1 W, 5%, fixed, comp.	R5
18525-395	RESISTOR: 47,000 ohms, ½ W, 1%, Wilkor CP½—1A	R34
3525-396	RESISTOR: 68,000 ohms, ½ W, 1%, Wilkor, CP½—1A	R8
3525-397	RESISTOR: 470,000 ohms, ½ W, 1%, Wilkor CP½—1A	R36
3525-398	RESISTOR: 1 meg, ½ W, 1%, Wilkor CP½—1A	R35
8575-12	RESISTOR: 1800 ohms, 10 W, 10%, fixed	R7
3575-19	RESISTOR: 100 ohms, 10%, center-tapped	R3, R4
3575-89	RESISTOR: 8500 ohms, 10 W, 10%, wire wound	R18
8411-472	RESISTOR: 470 ohms, ½W, 10%, fixed	R14
8670-109	RESISTOR, Spool: small, 25.5 ohms	R29
8670-111	RESISTOR, Spool: small, 40 ohms, ½%	R21, R25
3670-112	RESISTOR, Spool: small, 42 ohms	R23
8670-112	RESISTOR, Spool: small, 50 ohms	R11, R12, R22
8670-112	RESISTOR, Spool: small, 47.5 ohms	R26
8670-113	RESISTOR, Spool: small, 60 ohms, ½%	R20, R24
8670-122	RESISTOR, Spool: small, 400 ohms	R10
8670-123	RESISTOR, Spool: small, 455 ohms	R9
8670-126	RESISTOR, Spool: small, 845 ohms	R33
8670-127	RESISTOR, Spool: small, 1000 ohms	R15
8670-128	RESISTOR, Spool: small, 1200 ohms	R19
8670-133	RESISTOR, Spool: small, 2250 ohms	R17
8670-418	RESISTOR, Spool: medium, 150 ohms	R1
750-2	RHEOSTAT: 200 ohms, 25 W, Mod. D, Ohmite #2878-3 SC	R13
9350-1	SOCKET: bayonet, small, Drake #614-CH-LT	
9350-2	SOCKET: candelabra, Drake #414-14L-LT	
350-43	SOCKET: acorn, 7 contact, Alden #457V1M	
350-58	SOCKET: 9 pin yellow, Cinch #53F12884	
9350-76	SOCKET: 7 pin miniature, Amphenol #147-170-24	
9350-156	SOCKET: wafer, octal, Cinch #11961	
350-157	SOCKET: 4 pin wafer, Cinch #X154	

PARTS LIST FOR MODEL 539A TUBE TESTER

NOTE: There is a minimum billing charge of $1.50 for any one parts order.

HICKOK CODE NO.	NAME AND DESCRIPTION	REF. SYMBOL OR FUNCTION
19350-93	SOCKET: 4 pin, with ring retainer, Amphenol #78-S4M	
19350-94	SOCKET: 5 pin, with ring retainer, Amphenol #78-S5M	
19350-95	SOCKET: 6 pin, with ring retainer, Amphenol #78-S6M	
19350-96	SOCKET: 7 pin, with ring retainer, Amphenol #78-7CDM	
19350-97	SOCKET: 8 pin loktal, Amphenol #78-8LM	
19350-98	SOCKET: 8 pin octal, Amphenol #78-S8TM	
19350-101	SOCKET: subminiature, saddle mtg, Cinch #EXP8694	
19350-112	SOCKET, Ass'y: panel light, Drake #40	PILOT
19350-119	SOCKET: 7 contact, sub-miniature, Cinch #EXP-8736-B1	IN-LINE
19910-61	SWITCH: gang, 8 buttons, Oak #44983-130 (A5123)	PUSHBUTTON
19911-7	SWITCH: D.P.D.T., Oak #16743-78	METER REVERSE
19911-9	SWITCH: toggle, S.P.S.T., A.H. & H. #20994-DA	OFF-ON
19911-16	SWITCH: toggle, D.P.D.T., bat handle, A.H. & H.	NORMAL-SELF BIAS
19911-19	SWITCH: toggle, S.P.D.T., A.H. & H. #21350, with bat handle	CATH. ACT.
19912-227	SWITCH: 2 deck, 6 position, non-shorting	MICROMHO
19912-175	SWITCH: rotary, 5 section, 6 position, Oak #12782-H-5	SHORT TEST
19912-176	SWITCH: rotary, 1 section, 10 position	CATHODE-SUPPRESSOR
19912-177	SWITCH: rotary, 5 section, 10 position Oak #31595-H5	SELECTORS
19912-202	SWITCH: rotary, 1 section, 20 position	FILAMENT
19912-224	SWITCH: rotary, 3 pole, double throw, 1 section	METER RANGE
20800-69	TRANSFORMER: plate	
20800-103	TRANSFORMER: filament	
20875-6	TUBE: 5Y3GT/G	LOW VOLT. RECT.
20875-28	TUBE: 83	HIGH VOLT. RECT.

In ordering parts or materials for this instrument, the serial number must be given in order to identify properly the material required.

539A VOLTAGE CHECK AND CALIBRATION

This procedure will enable you to trouble shoot and calibrate the Hickok model 539A. Readings are approximate. Voltage measurements "A" are with a 1,000 ohms per volt sensitivity voltmeter and readings "B" are with a 20,000 ohms per volt voltmeter.

1. Check line adjust - set on red line.

2. Check shunt dial for indexing at zero.

3. With the cathode and supressor switches in the same position (Example 1-1, 2-2, etc.) the short test should show short on positions 2 and 3. (Exception 2 and 3).

4. Check bias voltage. On the 50 volt range it should be a maximun of 40 volts. Adjustment is R-15 (8.5K) variable resistor mounted on the board by the filament transformer. (Refer to the enclosed drawing for the exact location.) Return bias voltage to zero after test.

5. Place short switch in test position and set selector for 6L6 tube. (Jr 5347-2)

6. With an AC voltmeter place the prods in pins 2 and 7 of the octal socket, the filament voltages will be indicated. Check for proper voltages as filament switch is rotated. The AC filament voltages will be higher than indicated on the panel due to no load.

7. Cathode activity check. Place the cathode activity switch in the test position. Filament voltages should drop approximately 10%. Return the cathode activity switch to the normal position.

8. Set the signal input voltage to 2.5 volts, range D.

9. Check plate voltage by placing the negative lead of the DC voltmeter in pin 8 of the octal socket and the positive lead in pin 3. Push P4. Voltages should read; "A" Positive 150 vdc. "B" Positive 190 VDC.

10. Check screen voltage by placing the positive lead of the DC voltmeter in pin 4 of the octal socket. Press P4. Normal screen voltage is "A" positive 135 volts DC "B"positive 130 VDC.

11. Check Input Signal with a AC voltmeter utilyzing pins 2 and 7 of the octal socket. The readings should be as indicated on the function s switch.

12. A simulated mutual conductance test for mutual conductance ranges. A simulated test is used to determine the accuracy of the tester in porforming mutual conductance tests. Set selector for 6L6 tube. Normal tolerance is plus or minus one division (5). The following equiptment is necessary for this test: Variac,1,000 ohms per volt sensitivity voltmeter, 10K ohms, 20 watt resistor and a isolation transformer. Refer to the following drawing for the exact setup procedure.

539A VOLTAGE CHECK AND CALIBRATION

This procedure will enable you to trouble shoot and calibrate the Hickok model 539A. Readings are approximate. Voltage measurements "A" are with a 1,000 ohms per volt sensitivity voltmeter and readings "B" are with a 20,000 ohms per volt voltmeter.

1. Check line adjust - set on red line.

2. Check shunt dial for indexing at zero.

3. With the cathode and supressor switches in the same position (Example 1-1, 2-2, etc.) the short test should show short on positions 2 and 3. (Exception 2 and 3).

4. Check bias voltage. On the 50 volt range it should be a maximun of 40 volts. Adjustment is R-15 (8.5K) variable resistor mounted on the board by the filament transformer. (Refer to the enclosed drawing for the exact location.) Return bias voltage to zero after test.

5. Place short switch in test position and set selector for 6L6 tube. (Jr 5347-2)

6. With an AC voltmeter place the prods in pins 2 and 7 of the octal socket, the filament voltages will be indicated. Check for proper voltages as filament switch is rotated. The AC filament voltages will be higher than indicated on the panel due to no load.

7. Cathode activity check. Place the cathode activity switch in the test position. Filament voltages should drop approximately 10%. Return the cathode activity switch to the normal position.

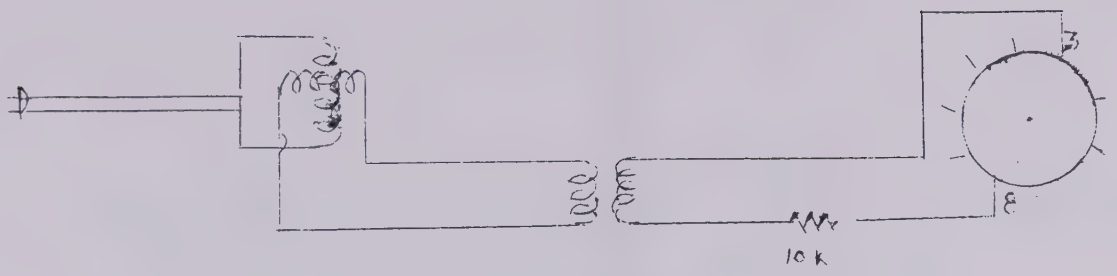
8. Set the siginal input voltage to 2.5 volts, range D.

9. Check plate voltage by placing the negative lead of the DC voltmeter in pin 8 of the octal socket and the positive lead in pin 3. Push P4. Voltages should read; "A" Positive 150 vdc. "B" Positive 190 VDC.

10. Check screen voltage by placing the positive lead of the DC voltmeter in pin 4 of the octal socket. Press P4. Normal screen voltage is "A" positive 135 volts DC "B"positive 130 VDC.

11. Check Input Siginal with a AC voltmeter utilyzing pins 2 and 7 of the octal socket. The readings should be as indicated on the function s switch.

12. A simulated mutual conductance test for mutual conductance ranges. A simulated test is used to determine the accuracy of the tester in performing mutual conductance tests. Set selector for 6L6 tube. Normal tolerance is plus or minus one division (5%). The following equiptment is necessary for this test: Variac,1,000 ohms per volt sensitivity voltmeter, 10K ohms, 20 watt resistor and a isolation transformer. Refer to the following drawing for the exact setup procedure.



Be sure the exact electrical setup is followed in order to prevent damage to the tester. Insert the lead from the 10k ohm resistor into pin 8 of the octal socket and the other lead into pin 3 of the octal socket. Remember numbering is counter clockwise on the top of the sockets. Normal indications should should read as follows: (6L6)

RANGE	VOLTS	PRESS	RESISTANCE
A	12.5	P-4	10 K Ohms, 20 watts
B	5.0	P-4	" " " " "
C	5.0	P-4	" " " " "
D	50.0	P-4	" " " " "
E	25.0	P-4	" " " " "

NOTE: Should meter read backwards, reverse line plug of tester.

13. Calibration procedure for R15 and R8. Refer to the enclosed drawing for exact location. All test selectors should be set in the 6L6 position. Insert the 6L6 tube. Set the mutual conductance switch to the 15,000 range. After the tube has thouroughly heated, adjust R15 for the same mutual conductance as indicated on the calibrated 6L6 tube.
NOTE: Calibration is made on mutual conductance not on English reading. Remove calibrated tube. Maintain all selectors on 6L6 selector set up. Set mutual conductance range to 600. Feed known 6.3 VAC between cathode and control grid on 6L6 socket thru a 10K ohms resistance. Adjust R8 For full scale deflection of Gm meter. Both potentiometers will be correctly set after followin. this procedure.

14. In the event you are not obtaining the correct readings we would suggest checking your test equiptment. A claibrated 6L6 tube. Hickok part # 20877-1, is available from the factory for mutual conductance comparisons. This tube is factory calibrated and a comparison of Gm readings can be accomplished for an accurate indication of tester performance.

ALT	DRAWING NUMBER
A	870W

POSTS FOR INSERTING METER TO READ HEATER CURRENT

SHORTING BAR

TEST NORMAL FIL ACT

OFF PILOT LAMP

METER 0-130VAC

FUSE LAMP

OFF ON

5Y3GT

83

R1 150Ω
R2 470K
R3 50Ω
R4 50Ω
R5 15K
R6 LEK
R7 1MΩ
R8 50Ω
R9 300Ω
R10 100Ω
R11 50Ω
R12 50Ω
R13 500Ω
R13 150Ω
R14 1K
R15 50Ω
R16 3K
R17 2250Ω
R18 8.5K
R19 1.2K
R20 1000Ω
R21 1000Ω
R22 600Ω
R23 470K
R24 410K
C1 8 μF
R25 1000Ω
R26 150Ω
R27 750Ω
R28 100Ω
R29 270Ω
R33 230Ω
R37 500Ω
R38 60Ω
R39 40Ω
R40 40Ω
R41 60Ω
R42 500Ω
R43 198Ω
R44 2Ω
R43 40K
R50 9900Ω
R51 200Ω

P7
P6
PUSH
P5
P4 LOCK
P4 NON LOCK
P3
P2
P1

NORM SELF BIAS

REAR SECTION

FUNCTION SWITCH

HI-LOW PLATE VOLTS

METER

REV. NORM

BIAS

6VR

MMO 115 μA

METER 1300Ω

C4 100 μF 6 W.V.

PANEL LAMP TEST SOCKET

OCTAL LOCTAL MIN ACORN NOVAL SUB MIN IN LINE

FILAMENT POSITIVE SWITCH NO 1

FILAMENT NEGATIVE SWITCH NO 2

GRID SWITCH NO 3

FRONT SECTIONS

REAR SECTIONS

ALL ROTARY SWITCHES SHOWN IN POSITION 1

PLATE SWITCH NO. 4

SCREEN SWITCH NO 5

CATHODE SWITCH NO. 6

SUPPRESSOR SWITCH NO. 7

FRONT SECTIONS

REAR SECTIONS

LEFT END OF ALL SWITCHES IS THE KNOB END

POSTS FOR INSERTING METER TO READ PLATE CURRENT

SHORTING BAR

GRID CAP

PLATE CAP

NOISE TEST

R30 100Ω L1
R31 100Ω L2
R32 100Ω L3
R34 150K
C5 470 μμF 500 V
NE-51
R35 120K
R36 120K
LO
HI
R45 250K

SHORTING BAR

POSTS FOR INSERTING SELF BIAS RESISTORS & CAPACITOR

R46 1M
C2 .05
R47 36K
R48 330K
C3 .5

FRONT SECTIONS

SHORT TEST SWITCH

REAR SECTIONS

SCHEMATIC
MODEL 5398 TUBE TESTER
MADE BY
THE HICKOK ELECTRICAL INSTRUMENT COMPANY
CLEVELAND, OHIO

SCHEMATIC WIRING DIAGRAM

USED ON MODEL 5398 TUBE TESTER			DATE 8-25-55
DRAWN	CHECKED	APPROVED	DRAWING NUMBER
P&K	HCM	[illegible]	870W

ALT	DRAWING NUMBER
A	760W

PANEL LAMP TEST SOCKET — OCTAL · LOCTAL · MIN · ACORN · NOVAL · SUB MIN · IN LINE

FILAMENT POSITIVE SWITCH NO 1 · FILAMENT NEGATIVE SWITCH NO 2 · GRID SWITCH NO 3 — FRONT SECTIONS / REAR SECTIONS

ALL ROTARY SWITCHES SHOWN IN POSITION 1

PLATE SWITCH NO 4 · SCREEN SWITCH NO 5 · CATHODE SWITCH NO 6 · SUPPRESSOR SWITCH NO 7 — FRONT SECTIONS / REAR SECTIONS

LEFT END OF ALL SWITCHES IS THE KNOB END

TEST · NORMAL · FIL ACT · PILOT LAMP · METER 0-130VAC · FUSE LAMP · OFF ON · 5Y3GT · R1 150Ω · R2 180K · R3 50Ω · R4 50Ω · R5 15K · R6 1.2K · R7 18K · R8 68K · R9 455Ω · R10 400Ω · R11 50Ω · R12 50Ω · R13 200Ω · C2 25µF · R16 3K · R17 2250Ω · R18 8.5K · R19 1.2K · C3 2700µµF 1000V · P1 · P2 · P3 · P4 LOCK · P4 NON LOCK · P5 · PUSH · P6 · P7

MICROMHO AND SIGNAL NGE SWITCH · NORM. · SELF BIAS · NORMAL · SELF BIAS · R20 60Ω · R21 40Ω · R22 50Ω · R23 42Ω · R24 60Ω · R25 40Ω · R26 475Ω · R27 1MEG · R28 1K · R29 255Ω · R33 845Ω · METER 97µA 250Ω · C6 100µF 6WV

BIAS VOLTMETER · 1000Ω/V · 10 · 50 · R14 470Ω 1W · C4 8MFD 150V · REAR SECTION · R15 1K

POSTS FOR INSERTING SELF BIAS RESISTORS & CAPACITOR

POSTS FOR INSERTING METER TO READ PLATE CURRENT · SHORTING BAR

GRID CAP · PLATE CAP · NOISE TEST · R30 100Ω L1 · R31 100Ω L2 · R32 100Ω L3 · C5 470 µµF 1000V · SHORT · TEST SWITCH · R34 47K · R35 1M · R36 470K · C7 .1µF 400V · SHORTING BAR · FRONT SECTIONS · REAR SECTIONS

SCHEMATIC

MODEL 539A TUBE TESTER

MADE BY
THE HICKOK ELECTRICAL INSTRUMENT COMPANY
CLEVELAND, OHIO

SCHEMATIC WIRING DIAGRAM

USED ON MODEL 539A TUBE TESTER			DATE 4-19-49
DRAWN	CHECKED	APPROVED	DRAWING NUMBER
P.J.K.	H.G.M.	J.R.B.	760W